PROGRAMMATIC MITIGATION PLAN

The following mitigation measures have been carried forward from the Wyodak EIS and the Wyodak Drainage EA . Any new mitigation resulting from analysis in this EIS will be disclosed in the Record of Decision and will be added or will replace or revise the mitigation measures already identified in this plan. Project design features that will be required, if applicable site-specifically, at the APD/POD level of analysis are compiled below as a programmatic mitigation plan for CBM development. Mitigation measures also are described in various sections of chapter 4 of the FEIS, where they are incorporated within the resource impact analyses. Requirements that are standard conditions of approval for CBM APD)s are described in Appendix C. The Buffalo Field Office's *Coalbed Methane Well Application for Permit to Drill and Project Plan of Development Preparation Guide*is also used as a guide to avoid or minimize environmental harm.

These mitigation measures can be applied by BLM as *Conditions of Approval* (COAs) at the ADP/POD approval stage and will be in addition to stipulations applied at the time of lease issuance. Additional site-specific COAs, identified during site specific NEPA analysis may also be applied at the APD/POD approval stage.

Geology and Minerals

Inadvertent release to the atmosphere of the methane resource will be controlled through WOGCC requirements and APD conditions of approval that address well control, casing, ventilation, and plugging procedures appropriate to site-specific CBM development plans.

Surface Water

A water management plan must accompany each federal APD/POD and must address all potential CBM development in a watershed area, regardless of surface and mineral ownership. Development of water management plans are the responsibility of the operators. These plans will be developed on a site-specific basis or on a project-level basis. The BLM and Forest Service, have primary oversight for these plans related to federal leases. The Corps of Engineers, Wyoming State Engineer's Office, WOGCC and/or WDEQ) also may have involvment along with conservation districts. Operators, landowners, and nearby downstream interests (including water users and landowners affected by impacts of increased flows on access, ranching, or mining operations) will also be involved. Cooperation between all stakeholders will be necessary in order to develop water management plans that identify mitigating measures for areas or drainages where high CBM-generated flows are or could be impacting existing uses. Some of the measures that could be applied, as appropriate, at each site include:

- Produced water will be dispersed in the upper reaches of drainages by installing stock tanks.

- Produced water will be transported to distant discharge points when required to avoid sensitive soils, agricultural areas that could be harmed, or areas of potential accelerated erosion.

- Produced water will be discharged into existing stream channels, reservoirs, stock ponds, and stock tanks in a manner that will not cause accelerated erosion. This has been done effectively in past CBM projects by using energy dissipaters at discharge points and by discharging into channels that are well developed and large enough to handle the

increased flows. Energy dissipation can be achieved by using rock, concrete control structures, or hydrophytic (water-loving) vegetation.

- Discharge points will be located to minimize spring flooding in fields and in accordance with surface owner agreements.

- Discharge outfalls will use alternative outfalls for use with irrigation, as agreed by the operator and landowner or lessee. If discharge water SAR values are not in compliance with WDEQ irrigation suitability evaluation criteria, water discharge on irrigated lands will be prohibited unless the operator treats the water to meet the criteria before discharging it, or confines the untreated water in compliant impoundment(s).

Treatment options that could be used and have been explored to reduce SAR levels include:

1. Off channel complete containment in evaporation/infiltration ponds.

2. On channel storage and dilution ponds, where dilution with the natural runoff will meet acceptable SAR values upon a discharge.

3. Ion exchange units.

4. Re-injection into potable and nonpotable aquifers if receivers are available to accept the water.

5. Infiltration leach fields.

- In those situations where treatment for barium would be necessary before WDEQ would issue a NPDES permit, the following treatment methods could be used:

    1. Allow the water to come in contact with soils, stream channels, and/or naturally occurring surface water.

    2. WDEQ requires BMPs at the wellhead to remove soluble iron. These aeration devices and small treatment ponds also work well to remove barium.

    3. CBM waters containing elevated barium (800 to 2,000 ug/1 range) may be discharged into stream channels immediately above a storage reservoir (CBM Associates 2001).

- To handle total flows with the addition of CBM produced waters, existing downstream culverts on lease will be replaced if flows exceed culvert capacity. New culverts and/or low water crossings will need to be sized to BLM standards for anticipated total flows. Off lease, it is recommended that the operator work with other operators and with surface owners in the same drainage to replace downstream undersized culverts that will be affected by their discharge.

- Discharges will be limited to a volume less than or equal to the naturally occurring mean annual peak flow (which is roughly equivalent to a peak generated by a 2-year, 24-hour storm) and that can be handled by the natural channel under anticipated conditions.

- Local springs will be identified, and construction in the areas will be avoided.

- Potential impacts to spring flow, specifically those related to scoria aquifers like the one feeding Moyer Springs, will be analyzed site-specifically, as needed, during review of APDs/PODs or sundry notices. Impacts will be mitigated by applying special conditions of approval for drilling or production operations.

- Discharge into playas will be avoided unless issues related to potential wetland creation, maintenance of discharge facilities, reclamation, and accountability are agreed to by the operator and landowner or lessee.

- Design and siting of discharge facilities must be avoided, carefully controlled, or limited where channels are not stable, armored, or large enough to accommodate the flows that will be anticipated.

- Design and location of discharge points must be carefully controlled or limited to ensure that localized flooding does not occur where channel or basin capacity is insufficient to handle increased flows.

- Discharge points will be selected in stable channels or reservoirs away from any significant downstream headcuts or other major erosional features. Outfall design may include discharge aprons and downstream stabilization of channel side slopes to prevent erosion and provide energy dissipation.

- Discharge facilities will be site-specifically designed using best management practices, to accommodate livestock access to water, to control erosion, and to limit sedimentation.

- Irrigation diversions and in-stream impoundments will be established, as appropriate, and as agreed to by the operator and landowner or lessee. Downstream impoundments may need new or redesigned outlet works in order to handle the steady inflow provided by CBM discharge water.

- The areal extent of surface disturbance and the length of time that the area will remain disturbed before interim or final reclamation activities commence will be minimized.

- Interim and final reclamation of all disturbed areas will proceed in a timely manner. Reclamation activities will be conducted during timeframes established by federal land management agencies, landowners, and affected interests.

- Reclamation must produce a natural appearance and must be consistent with site conditions, area management standards, and projected uses, as agreed to by the operator, landowner or lessee, and appropriate state and federal agencies.

- Reclamation will include, as appropriate, recontouring, establishing desirable, perennial vegetation, and stabilizing and controlling erosion of all disturbed areas. Additional measures, such as topsoil conservation, temporary fencing, mulching, or weed control will be used as necessary to ensure long-term vegetative stabilization of all disturbed areas. Reclamation standards will be agreed to between the operator, landowner or lessee, and appropriate state and federal agencies.

- At the discretion of the surface owner, dams will be removed and the impoundment area reclaimed after the produced water is no longer available.

- Timely recontouring and revegetation of disturbed areas will be required to limit runoff from disturbed areas that could cause sediment concentrations in surface waters to rise over pre-disturbance levels.

Groundwater

- A standard agreement has been developed by CBM operators and landowners to monitor and mitigate water well impacts caused by CBM operations.

Air Quality

Air quality issues related to stationary sources of air pollution will be addressed in accordance with the authorities of the WDEQ. Air quality issues related to mobile sources of air pollution will be addressed in accordance with the authorities of the EPA. Visibility impairment within federally mandated Class I areas will be addressed in accordance with federal regulations on regional haze. Visibility impairment at other Class I and sensitive Class II areas will be addressed in accordance with the recommendations from interagency and stakeholder coordinating groups.

At the discretion of the surface owner, and in accordance with permitting decisions made by the WDEQ, compressors and compressor stations should be sited to avoid sensitive surface resources and potential conflicts with other uses.

Under the regulatory authority of the WDEQ and at the discretion of the landowner and the CBM operator, the implementation cost and effectiveness of electrification of compressors and other BACT will be considered.

Soils

Areas of highly erosive soils will be avoided when drill sites, two-track access routes, and pipeline routes are surveyed and staked in order to substantially reduce the amount of soil loss.

Wetlands

For any jurisdictional wetlands identified that may be impacted, a detailed mitigation plan will be developed during the APD/POD or sundry notice approval process. Federal requirements to replace all impacted wetlands will mitigate this loss, so environmental impacts will occur only during the life of the project (including reclamation).

To reduce adverse effects on existing wetlands, water discharge should not be allowed if increased discharge volumes or subsequent recharge of shallow aquifers will inundate and kill woody species, such as willows or cottonwoods.

- Discharge into playas and will be avoided unless issues related to potential wetland creation, maintenance of discharge facilities, reclamation, and accountability are agreed to by the operator and landowner or lessee. If discharge is allowed at the discretion of the surface owner, fencing wetlands and providing off-site watering for livestock will be used to allow

vegetation to develop and to maintain water quality in key wetlands. Any fences used should be placed well back from the wetlands to prevent waterfowl mortalities and should be constructed to standards that allow big game movement.

Wildlife

Power line corridors will avoid wetlands, to the extent possible, in order to reduce the chance of waterfowl hitting the lines.

Cultural Resources

A cultural inventory will be conducted on all areas of proposed surface disturbance at the APD/POD or sundry notice phase of each action.

Specific plans for avoidance or data recovery will be recommended for any significant sites within the area of potential effect of the proposed activities.

Land Use and Transportation

If CBM development activities are proposed in the vicinity of scattered subdivisions near Gillette, site-specific mitigating measures will be developed to minimize the impacts and to resolve conflicts.

Over the project life, uneconomic and depleted wells will be plugged and abandoned, and the disturbance reclaimed and revegetated to approximate pre-project conditions.

CBM facilities such as central gathering and metering facilities or compression facilities will be fenced as specified by the BLM.

Roads and facilities no longer needed will be removed and the affected area will be rehabilitated.

Where feasible, gas and water pipelines and electrical cables will be installed in the access road corridor.

Visual Resources

Long-term visual impacts will be minimized by designing permanent structures so that they blend with the surrounding landscape to the extent feasible. Disturbed areas no longer needed for operations will be recontoured and revegetated as soon as practicable, and straight edges made by roads, pipelines, well pads, and compression facilities will be reshaped to create irregular or indistinct edges.

Proposed facility developments on BLM-administered federal surface will be consistent with BLM management objectives for mapped VRM classes.

All proposed wells and facilities on FS-administered federal surface will be consistent with visual quality objectives for the Thunder Basin National Grassland. Adverse impacts will be minimized by locating facilities, minimizing disturbance of affected sites, and by designing facilities so that they blend in with the surrounding landscape.

Using two-track and existing roads and centralizing gas compression facilities along existing roads will minimize the visual impact of the road network.

Use buried power lines to each well, where feasible, to reduce the linear element in the landscape.

Construction debris will be removed immediately.

Resource protection measures proposed for erosion control, road construction, rehabilitation and revegetation, and wildlife protection will be implemented during approval of APDs and sundry notices. These measures also will mitigate impacts to visual quality.

Noise

Compressors should be located at least 600 feet from sensitive receptors (residences, schools, medical facilities, and recreation areas). Under current Wyoming law, the WDEQ can only require this mitigation to occur if municipal or county land use plans address siting of noise emitters.